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School—Its Purposes and
Methods* ✓ ✓ ✓

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THE MODERN UNIVERSITY SCHOOL—ITS PURPOSES AND METHODS.*

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CHICAGO.

Surv. of Amer. medical schools

The earliest American medical schools were established in connection with institutions of general learning, as would have been expected from the fact that the physicians who founded them had been educated in Great Britain and France, where the medical colleges were, without exception, departments of universities. Only a few of the American schools, however, were established with such a relation, the larger majority being quite independent of any university or college connection, so that in 1877, twenty-five years ago, less than twenty of the sixty-five medical colleges then in existence were connected in any way with institutions of general learning. Subsequent to that date, however, such schools have become much more numerous, and of the one hundred and fifty-eight medical schools at present existing in America, between sixty and seventy are connected with a university or college.

These facts suggest some interesting queries. Why were not all of our medical schools, following the example of those first founded, established in connection with institutions of general learning? What motives have prompted the movement which, starting about 1880, has resulted in the large increase in medical schools so connected? What is the nature of the relationship which exists to-day between the medical schools and the universities with which they are connected? Has this re-

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lationship resulted in the largest possible measure of advantage to either the medical school or the university? And finally, what should be the nature of this relationship in order that the best results may be secured?

THE DIFFERENT CONDITIONS IN THE EARLY DAYS.

In answer to the first query it may be noted that there were no universities in America in the broad, European sense until comparatively recent years. Our institutions of higher learning were, as most of them still remain, colleges, devoted to purely academic instruction, in the classics, mathematics and philosophy. Such an institution has nothing in common with the professional school, and there can be little advantage or propriety in any connection between them. Then, too, it was hardly possible to establish the medical school on such a basis as to make it a fit member of a university organization. The rapidly-growing country demanded physicians in large numbers, trained as best they might be for practical life, but with requirements and the expense of the college course such as not to place it beyond the reach of all but a few students. Until the middle of the last century the majority of students entered the practice of medicine through an apprenticeship with a preceptor. The chief problem was how to induce these students to spend any time at all in the medical school, and to have exacted high requirements for admission, and a prolonged and expensive course would have been to defeat the very purpose for which the school was established. But a college with such standards, little or no restriction as to preliminary education, graduating after attendance on two, four or five months' sessions of repetitional lecture courses, could not fittingly have been made a department of a true university.

Thus medical colleges came to be established by medical men as independent institutions, sometimes, it is true, with other than the highest motives, but, on the whole, with an honest purpose to meet a real need. In passing judgment on these colleges and their founders due regard must be taken of the conditions which obtained at the time they were organized. In the absence of endowment or financial aid from the state the college had no resources excepting from the fees of students, which were of necessity low. It was imperative that

the standards of the school should be such as to insure a sufficient number of students to maintain it on a working basis. For the past twenty-five years there has been no real demand for more medical colleges, and the judgment if not the motives of those who have instituted most of the colleges established within this period may well be questioned, but previous to that time the physicians who established the medical colleges of the old type were, with few exceptions, animated by an honest purpose, and possessed a logical and discriminating judgment in adjusting the standards of education very closely to the needs and conditions of the times. These institutions, sometimes styled commercial, never, so far as I have knowledge, yielded a direct money profit, though the indirect return to the occupants of the clinical chairs was in many cases large. Fortunately, the demand for physicians is no longer such as to compel the maintenance of schools with low standards.

THE TRUE UNIVERSITY.

The true university dates its inception in America from the founding of the Johns Hopkins University, which within a few months has celebrated its twenty-fifth anniversary. From this institution, with its emphatic pronouncement that the extension of knowledge by original investigation must constitute the very essence of the true university, can be directly traced the origin of the university idea in this country. Soon Harvard, Yale, Columbia and Pennsylvania caught the new spirit, and the founding of the Clark University in the early '80s, with the growth of Cornell and some of the state universities, gave evidence of the fact that the university idea had taken deep and abiding root in American soil. Unfortunately, however, many other colleges, entirely lacking the means, the men or the equipment essential for true university work, stimulated by a feeling of rivalry, became ambitious to pose under the larger name. Mistaking mere multiplicity of departments and a large enrolment of students as the essential features of the university, they promptly became, by a mere process of rechristening, nominal universities. Naturally the next step was to institute professional departments, and, as in many cases, colleges of law, medicine,

dentistry, pharmacy and the like, already established and prosperous, were located in more or less close proximity, the ambitious university found it much easier to expand along these lines by a process of amalgamation than by the creation of wholly new departments. The professional schools were, in most cases, more than willing to enter into such an alliance, for they, too, had caught the university idea in the same superficial way, and had come to feel that a university connection of some sort was the order of the day, and that the medical school must be so connected to be in vogue. Yet another motive was found in many cases in the rapidly-increasing cost of maintenance. The introduction of laboratory methods, the necessity for salaried teachers in the fundamental branches, and for the maintenance of hospitals and dispensaries to provide adequate clinical material had increased the cost of the medical course beyond the student's ability to pay for it even when the fees were increased to twice those formerly charged. It was obvious that governmental aid or private endowment must be had and that this could seldom be secured by the medical college as an independent institution.

THE NOMINAL CONNECTION WITH A UNIVERSITY.

The character of the relationship, however, which exists between the college or university and the medical school has been in the large majority of cases purely nominal, as evidence of which a specific case will serve. I have in mind an institution which blossomed forth in a few months from a college with less than four hundred students into a university with an enrolment of nearly twenty-five hundred. An analysis of the student list, however, discovers the fact that about eight hundred of these students were in the medical college, which had added to its title "The Medical Department ——— University," over four hundred were in a dental college, similarly allied, some two hundred in a law school, and a large number in a school of pharmacy. The number of students in the actual collegiate departments had not increased nor had the number of members in the faculty, while the courses offered and the character of the work done had not been materially altered. And what was the nature of the union between this "university" and its constituent professional

schools? Purely nominal. They had not surrendered one iota of their autonomy. The separate board of trustees and faculty were in each case retained intact, having entire and unrestricted control over the finances of the professional school, of appointments to its faculty, of the standards of admission and graduation, and of all its other affairs. These departments were located several miles from the university, and the only visible evidence of their connection with it, aside from the printed line on the announcements and letter heads, was the appearance of the president of the university to confer the degrees at the annual commencement.

While this example represents the extreme degree of looseness, in such a connection, it differs only in a degree from that of the large majority of the medical schools now connected with universities in this country. May not the real value of such an alliance, to either the university or the professional school, be fairly questioned? There has been a disposition to attribute to these university connections the rapid progress which has taken place in medical education in recent years, but it is difficult to conceive how such a purely nominal relation can have had much influence in this regard. This progress, comprising the elevation of the standards of admission and graduation, the lengthening and grading of the curriculum, the introduction of new branches and of improved methods of instruction, has come about as the inevitable result of the advancement which has been going on in all lines of education. The development of the true university and of the university spirit in America has had much, indeed most, to do with it, but not through any such nominal relationship as in the case above cited. It is a singular fact that even in the older medical schools, which were from their inception university departments, the relation of the medical with the general faculty has had so little of unity or intimacy about it. The medical department is usually removed by some distance from the university proper, the faculties never meet together, and in almost every respect the medical school is conducted as an independent institution.

THE PROPER RELATIONSHIP TO THE UNIVERSITY.

The largest service can never be accomplished by the

medical school nor can the fullest measure of advantage result to it or to the university from such a purely nominal relationship. What, then, should be the nature of the union between the medical school and the university of which it is a part?

It must be made an intimate, integral part of the university. Its financial management must be given over wholly to the board of university trustees, a body of laymen with large business experience, deriving no pecuniary advantage from this position and commanding the fullest confidence of the community. Only by such an arrangement, and the assurance of wise and disinterested management which it affords, can private endowment be successfully invited. It would be of distinct advantage to the university to have at least one medical man on this board of trustees. The medical teachers must be members of the university faculty, sitting in its councils and having a voice in the educational policy of the whole institution, while, on the other hand, the conduct of the medical work should be subject to the advice and approval of the general faculty.

THE FUNDAMENTAL BRANCHES.

The teaching of the fundamental medical branches which constitute the first two years of the curriculum, as now arranged, should be conducted in the corresponding university departments of physics, chemistry, anatomy, zoology, physiology and bacteriology. Even pharmacology and fundamental pathology should be so taught, for in the widest and best sense these sciences are branches of general learning and should be provided for in the university quite apart from their medical significance. The advantages of such an arrangement are many and important. It will obviate the expensive duplication of departments as they exist now under the prevailing system. Most of these branches are at present taught in the university proper, in well-appointed laboratories, by men who are devoting their lives to research and teaching in their respective lines, yet at the medical school of the same institution this expensive equipment is duplicated and another corps of teachers employed, either on a similar basis, or more often as men who are primarily practitioners of medicine, only incidentally teaching these subjects in a perfunctory way while wait-

ing for some incumbent of a clinical chair to vacate by death, resignation or otherwise, and thus make possible the fulfilment of their real ambition. Of more importance is the fact that these subjects can only be taught in the right way in the university proper, for only there can they be so pursued as to lay a broad, thorough foundation for their subsequent application to clinical medicine.

MEDICINE AS APPLIED SCIENCE.

Medicine is applied science. Its practice consists in the application of the principles, facts and methods of chemistry, anatomy, etc., to the study and treatment of the diseases and accidents of the living body. In the pursuit of any applied science it is surely the logical method to master the general principles and methods first and to proceed therefrom to a study of their application in any specific direction. Fundamentally the chemistry which the physician needs to know is quite the same as that required by the metallurgist, the manufacturing chemist, the pharmacist, or one in any other vocation where chemistry is concerned. It is only in the application of chemistry along these special lines that the methods differ.

The medical school has for years been attempting to teach its students the fundamentals of chemistry and their specific application at the same time. In the short course of two five months' sessions there seemed to be no escape from this. But what was the result? The student, crowded for time and jealous of every minute, sought to learn, as his professor sought to teach him, those isolated facts of chemistry which seemed, at the time, to have most direct bearing on medicine. Yet no teacher, however wise, much less any student, could possibly anticipate the chemical knowledge which might be of medical import a few years in the future, in the rapidly-progressing art and science of medicine. The result was a half knowledge mostly soon forgotten. If the medical man is to have a groundwork in chemistry which will enable him to keep abreast with his profession, he must be so trained in the fundamental facts and principles as to enable him to keep in touch with the advances in that science, to read its literature intelligently and to apply the frequent new discoveries to his

daily work. To illustrate: ten years ago the remarkable facts of physical chemistry relative to the behavior of mineral salts in very dilute solution—the so-called ionic condition of matter—would have been pronounced by any chemist as among the most theoretical and impractical facts of that science, yet already the investigations of Loeb and his pupils have demonstrated these facts to have a most important bearing on physiology, pathology and pharmacology. Indeed, it is not too much to say that these facts of physical chemistry, which we owe to Arrhenius and van t'Hoff, offer an apparent promise of a solution of more problems in the fundamental and practical medical sciences than any others now known to us. Few physicians trained by the older methods of the medical school, have been able to keep pace with these developments or even to read them understandingly, but to the medical man who received an adequate training in chemistry in a college or university, they present little difficulty.

What has been said in reference to chemistry is equally true of anatomy, both gross and microscopic, of neurology, embryology, physiology and physiologic chemistry, of bacteriology and pathology. Studied primarily in the atmosphere and by the methods of the university the ground-work of these sciences is laid in a broad and comprehensive manner which enables the student to follow their progress in later years and their specific application to medicine and surgery is easily acquired. Pursued in the illogical, unsystematic manner of former years, they are never mastered and too often the physician soon awakes to the unpleasant consciousness that the facts acquired at such a laborious expenditure of time and energy have most of them flown from his memory. Not only has he failed to keep abreast with the newer knowledge—he has forgotten the old. Life is too short and time too precious to be wasted in memorizing facts that must soon be forgotten.

THE BENEFITS OF THE UNIVERSITY ATMOSPHERE.

Great benefit will come to the student from two or three years spent in the atmosphere of the university in the daily companionship of men who are masters in their several departments and who, as investigators, are seeking to add new knowledge by their own discoveries.

The spirit and method of the research worker is exactly that of the successful practitioner of medicine whose every case is a problem, never exactly like any other that has been met before. Such problems are never satisfactorily solved by routine rules of diagnosis and treatment, but only by the exact painstaking examination of the facts in the particular case and the application thereto of the principles of anatomy, physiology and pathology. The successful practitioner is he who is most completely a master of this "investigative" ability, and who avoids most effectually the pressing temptation to become a "routine" doctor.

Of the influence on the student of the social and intellectual life of the university it is hardly necessary to speak. No environment is more conducive to the development of a strong, broad-minded influential man and citizen, and that is what we would wish every physician to be. The transfer of the teaching of the fundamental branches to the halls and laboratories of the university proper, will do more toward the creation of a strong and influential profession than any other plan that has yet been tried. For this reason, and because it is adaptable to so many medical schools, it seems to me to be the most progressive and far-reaching movement which has yet been made in medical education.

THE PURPOSES OF THE UNIVERSITY MEDICAL SCHOOL.

The purposes of the university medical school, organized on the lines indicated, will be broader and more comprehensive than those of the existing medical schools because of its larger facilities and possibilities. They may be briefly summarized: 1. The preparation of men for the practice of medicine—undergraduate instruction; 2, the training of selected students for teaching and research work; 3, to offer opportunities for practitioners to keep pace with the advance of medicine—such as are now afforded by the polyclinic schools; 4, the preparation of men for public health service; 5, to extend the bounds of medical knowledge by affording opportunity and encouragement for research work; 6, to investigate and pronounce authoritatively on alleged new discoveries bearing on medicine, and 7, to educate the public along medical lines by the methods of university extension.

THE UNDERGRADUATE STUDENT.

The preparation of young men for the practice of medicine in the usual sense of the term, must always constitute the largest and most important function of the university medical school. And by this is meant the education of students for the humblest as well as the most exalted walks of the profession. Time was when the college or university was an exclusive institution, whose members were disposed to feel themselves removed from the world at large, set apart for certain special and exalted duties. Happily that time is past and the modern university seeks above all things to keep in touch with and to supply the needs of the world of affairs, wherever and whenever it can do so. Witness the rapid growth of the university extension, of correspondence courses, of short courses in agriculture, pedagogy and the like, and of the establishment of departments of agriculture, economics, banking and commerce, journalism and other ultra-practical branches.

THE STANDARDS OF ADMISSION.

The attitude which the university medical school assumes in regard to this matter will largely determine its standards of admission and graduation. While the university must stand always for the highest practicable requirements, it seeks not to cut itself off from the education of men who are needed for the work of the world by placing these standards beyond the reach of all but a few. Its requirements must be adjusted to the conditions of the times and be gradually raised as the community is educated up to their endorsement and to the adequate appreciation and support of the men whom the university has trained. It would be a great misfortune if the university medical school were to confine itself to the instruction of the select few who would find adequate recompense for their expensive training only in the higher walks of professional life. Such a policy would inevitably result in a wide and ever widening breach between the few schools of this class, and the great number of medical colleges with low standards to whom would fall the teaching of the rank and file of the profession.

We hear much of an ideal standard of admission to the medical school. And what may that be? Surely

not the bachelor's degree, for as conferred in this country by the thousand or more institutions empowered to grant it, it is no standard at all, its significance ranging from less than many high school diplomas to that conferred by the highest grade universities. One institution, to my knowledge, admits students from the grammar school, confers a bachelor's degree after two sessions of fifty weeks each, allowing the student during the same period to complete the course for the degree of Ph.G. If knowledge of certain specific branches be demanded in addition to the bachelor's degree, may it not well be asked why, if these are the essential things, the degree should be made a prerequisite at all?

The degree which affords the nearest approach to an ideal is that of Ph.D. This degree has been guarded with much more care in America than any other. It certifies, when from any standard institution, that the student has not only pursued a seven years' course of collegiate instruction, but that he has given evidence of capacity as an investigator—of the very qualities of mind, indeed, which are most demanded in the study and practice of medicine. But would any one contend that such a requirement could reasonably be exacted of all candidates for admission to the medical college under the conditions and emoluments of private practice at present in vogue? Such a demand would be "ideal" under ideal conditions and an ideal appreciation by the public, of the physician's merit and the compensation due him. but the truly "ideal" standard, in the most useful sense of the word, is that which best fits the graduate in medicine for the conditions of his time, and this must be, for a long time to come, not a fixed but a gradually increasing standard.

THE TRULY IDEAL STANDARD.

And what may be fairly demanded under existing conditions? Bearing in mind the readiness with which the medical schools have met the rapidly increasing demands of the last decade—demands, in large part created by the schools themselves—there can reasonably be exacted in the near future, by every medical school, a four-year high-school education, and, in addition, two years of college work, insisting that this be partly in chemistry, physics, biology, mathematics, English, Ger-

man and French—branches which are especially needful as a preparation for medical work. And with such a preparatory course the student can procure the bachelor's degree in the university medical school by applying his credits for the first two years of his purely medical work on the course for that degree, without in any degree doing violence to existing university procedure. The fundamental medical branches, if taught in the university itself, by university teachers and university methods, have quite the same culture value as have geology, astronomy or any of the other sciences, and credits for work in these branches should count on the scientific or arts course in exactly the same way. Under such an arrangement the average student is able to secure the degrees of B.S. and M.D. in from six to six and a half years from the date of his entrance to college, should begin his medical work at the age of 21 or 22, and be launched into practical life, with a year of hospital training, at 26 or 27. The problem of launching young men into professional life with an adequate training at an earlier age than has been possible under the existing methods, has been much discussed by leading educators. In some of our best universities the course for the bachelor's degree has been shortened to three years. The plan here outlined, of telescoping the literary or scientific with the professional course, where they so nearly correspond, seems to offer a much more logical and satisfactory solution. The advantage to many students of a complete collegiate course of four years, as precedent to the medical school, is clearly recognized, and every inducement should be offered such students to prolong their course of preparation. The right of any school to insist on a four years' college course as a standard of admission may not be gainsaid. It is only meant to contend that it would be unfortunate for the community if all of the high-grade schools were to adopt such a policy.

Should any special medical degree be conferred on the student who has presented a bachelor's degree for admission? Not unless he gives evidence in his medical course of the superior capacity and attainments, which he should have derived from his longer course of preparation. And, if he does this, if he manifests the investigative ability, and accomplishes research work in

the medical branches similar to that which is demanded for a master's degree or the degree of doctor of philosophy, one of these degrees should be conferred.

THE PREPARATION OF THE TEACHER AND INVESTIGATOR.

Recent changes in the methods of medical education have greatly increased the demand for men who have been especially trained for the work of teaching and investigation and who prepare themselves with the intention of devoting their lives to such work. Not the least, therefore, of the functions of the university medical school will be the education of this class of students. And how shall these students be selected? Shall the entrance requirements for these pupils be different from those exacted of the larger group who are preparing for the practice of medicine? I believe not, for no plan of examination can ever enable a faculty to select such men so wisely as will the observation of their daily work in the regular course of instruction. One of the most capable and successful investigators and teachers whom I have known possessed only a high school diploma when he entered the medical school, yet in his sophomore year he accomplished a piece of research work which would have done credit to a doctor of philosophy, and immediately after his graduation he was appointed to a responsible university position, which he fills with distinction. It is not at all certain that this young man has done an unwise thing in foregoing a collegiate career. True, his case is somewhat of an exception to the general rule, but provision must be made for such exceptions. Furthermore, it is of mutual advantage to the research worker and to the ordinary student, that they be educated in the same institution and in daily contact with each other—to the ordinary student because it is of the greatest advantage to him that he should be in the atmosphere and should catch the investigation spirit; from the standpoint of the research worker because the selection of such men can best be made from large groups of students who are revealing their special abilities and characteristics to their teachers in their daily work.

THE UNIVERSITY POLICLINIC.

In every progressive occupation, reports of progress from all over the world find their way most quickly to

the large centers and men who are themselves engaged in teaching and investigation are most likely to keep informed as to the new discoveries which are being made. The physician engaged in a busy practice, far removed from such a center, finds it difficult, even with the abundant current literature and the aid of a good library and laboratory, to keep thoroughly abreast of the times. He finds it of advantage, therefore, to seek such a center from time to time, to spend a few weeks in special postgraduate study. The necessity for this sort of review on the part of the general practitioner has been especially pressing during the last few years, owing to the enormous and rapid advance of the medical sciences. How great has been the demand for facilities in this direction is evidenced by the large number of polyclinic and postgraduate schools which have come into existence since 1882. These institutions have met a real need and have been of great service, but it is not too much to say that they have not been organized on the best possible basis nor do they offer facilities for the highest kind of work. A great variety of work is demanded by these polyclinic students; some need courses even more fundamental than the ordinary undergraduate, for whole new sciences, like bacteriology, have been created since these gentlemen took their medical degrees; some few are really competent to enter on the study of and preparation for a specialty, while a few have the necessary equipment and qualities of mind demanded by research work of a high order. To adequately supply these various demands, needs an institution of large resources, a large faculty, and very large hospital facilities. Only the university medical school has anything like the equipment necessary for this work, and the instruction of practitioners, in the broadest, most complete manner, will constitute one of its important functions. The university polyclinic will not be conducted on the "Make-a-specialist-of-you-while-you-wait" policy that has too often prevailed, but for the sound and legitimate purpose of enabling the practitioner to continue his student-life, and to keep in touch with the new knowledge and improved methods so that he may utilize them in his daily work. Its laboratories and libraries will be at all times open to the physicians in proximity to the university that they may the more

thoroughly and exhaustively study their cases by the methods and apparatus and the literature not otherwise at their command.

THE EDUCATION OF THE SANITARIAN.

Courses in state medicine and sanitary science are a pressing need of the time. Preventive medicine has profited far more than curative medicine by the discoveries of recent years, especially in bacteriology. Our hope for the future lies in the education of the public in regard to matters already well known to the profession, in the enactment of suitable laws, and in the efficiency of properly trained health officers, city, state and national. State medicine constitutes a distinct specialty and its successful pursuit demands a particular course of study which should extend over at least two years. Nowhere can the facilities for such a course of post-graduate instruction be adequately afforded excepting in the university, with its many departments, its large corps of trained investigators and teachers, and its well-appointed laboratories. In the department of geology, there may be studied the character of rocks and soils and of physiography in their relation to water supply, drainage, sewage disposal, and the like; in the department of chemistry, instruction in water analysis, toxicology and the chemistry of food and drug adulteration, will be offered; in the department of zoology, a knowledge may be acquired of animal parasites and of the microscopic examination of animal foodstuffs for their detection; the department of bacteriology will occupy a conspicuous position in this course in state medicine for the study of the bacteriologic examination of water, of milk, and other foods, and the detection of the various pathogenic organisms; the theories and methods of disinfection should be fundamentally studied; in the department of pathology, connected as it must be with a large hospital, there will be taught the methods of conducting a postmortem examination, especially in connection with medicolegal cases. And, finally, practical instruction must be afforded, in the health department of the city itself, in such matters as house inspection, the testing of sewer traps and other plumbing, public vaccination, the detection of cases of infectious diseases, the institution and maintenance of quarantine,

the registration of vital statistics, the best methods of educating the community by the circulation of pamphlets, through the public press, and otherwise. There are few health officers who would not heartily coöperate with the university in offering such facilities as this, as these students can be of great service to the health department in the conduct of its daily work, and they would thus make abundant return for the instruction received.

THE PROMOTION OF RESEARCH WORK.

The obligation of the university and of everyone connected with it, to extend the bounds of knowledge by independent research, is now universally recognized. Investigation of the unknown as distinguished from mere appreciative study of the work of others, constitutes the keynote of the modern university, and this will be no less emphatically a feature of the medical than of its other departments. Investigation is essential, however, not simply that the bounds of knowledge may be extended, but that the spirit and method of research may be inculcated in every student. It is important that this fact be kept in mind for a thorough appreciation of this purpose will affect most decidedly the attitude of the teacher toward his pupils. He is not discharging his full duty nor doing the largest service when he confines his attention and devotes his best energies to the few selected students who demonstrate special capacity for such work and give promise of developing into competent investigators. Naturally, his interest will be especially aroused in this group of pupils. but he has no less an obligation to inculcate the same spirit and to train in the same methods of work the less capable individuals who are preparing for the ordinary practice of medicine.

RESEARCH IN THE CLINICAL BRANCHES.

In several American universities superior opportunities for investigation in the fundamental medical sciences of anatomy, physiology, chemistry, bacteriology, pharmacology, embryology, physiological chemistry, and pathology, are now afforded, and research work of a high order is being conducted in these branches. Quite as important, however, are the clinical branches of medicine and it remains for the university medical

school to provide the men and the facilities to take up research work along these lines. This means, in the first place, the provision of a corps of teachers in each of the clinical branches who, divorced entirely from the labor and distractions of active practice, may devote themselves unreservedly to teaching and investigation in their several departments. This does not by any means imply that there will be no place in the faculty of such a school for the teacher who is at the same time a practitioner of medicine. Medicine, as has been said before, is an applied science and in its teaching force there will always be need of men who are daily engaged in the application—the regular practice—of their vocation. A large part of the necessary instruction of the student can only be accomplished by such teachers. Nor will the active practitioner be excluded from the privileges and obligations of research. Most of the advances in medicine which have been made up to the present time have been accomplished by physicians in active practice. Doubtless some of these men might have accomplished more in the way of discovery had they been freed from the exacting duties of practice, but we may not say this of them all. Some of these discoverers doubtless found in the conditions of their daily work the very incentive and environment which was essential to their investigations. Certainly this has been true in the other applied sciences, as, for example, in electrical, mechanical and chemical engineering, some of the most important discoveries in which, not only in methods of application, but in fundamental principles have been made by men who were practicing engineers.

In the second place, investigation in the clinical branches demands the provision of special hospitals, absolutely under the control of the university, perfectly equipped and adequately supported, where patients may be studied under conditions which have not yet obtained in full measure in any hospitals with which I am acquainted. It will be of advantage, if there can be brought together in such a hospital, from time to time, groups of cases of the same or allied disorders. What might not be discovered, for example, from an exhaustive study of a group of forty or fifty cases of diabetes mellitus, gathered in one building for a few months.

where the condition could be absolutely controlled? That every such hospital must have abundant laboratory facilities and a corps of trained assistants goes without saying.

THE INVESTIGATION OF ALLEGED DISCOVERIES.

From time to time there arise in medicine fads and 'isms and 'pathies, loudly heralded by their promulgators as the only and long-awaited panacea for all the ills that flesh is heir to, and such has been the history of the world since time began. Many such claimants for popular credence carry their own refutation and are no more worthy of investigation by the university than would be the claims of the newspaper weather-prophet or the street-corner astrologer and horologist. Some of these passing fancies, however, take a strong hold on the public mind, and much harm results, before the utter falsity of the fad is demonstrated, or, possibly, the small kernel of truth winnowed from the mass of chaff. Often it would seem as if the credulity of the public were in direct ratio to the absurdity of the claims of the system. The fancied division in the public mind of scientific medicine into so-called "schools," and the supposed animosity of the adherents of these schools toward each other, has precluded the possibility of any investigation and pronouncement from the independent medical college having any considerable weight or authority. May not the university with its large faculty, representing many phases of thought, and free from the suspicion of prejudice, perform an important service to the community by the impartial investigation of such claimants as seem at all worthy of serious consideration, and a candid statement of the facts? In the broad open spirit of liberality and desire for the truth, which should characterize the university, the advocates of any new system or 'pathy might properly be invited to present their claims before the faculty or a commission to be selected for that purpose. Such an investigation as that conducted under the auspices of the university of Pennsylvania a few years ago—the Seybert Commission for the investigation of spiritualism—occurs as an illustration of the thought here presented.

UNIVERSITY EXTENSION AS RELATED TO MEDICINE.

If the beneficent results to the recent enormous ad-

vance in our knowledge of preventive medicine are to be realized in any large measure, this can only be by means of the education of the public in matters of personal and community hygiene. The medical profession has been remiss in this direction, but this has been in large part owing to the difficulty of addressing the public without violating the established ethics of the profession. The practitioner, competent to give instruction, has hesitated to do so because of the certain imputation of ulterior motives, the charge that he was seeking to exploit his knowledge and so secure his own aggrandizement. A great work awaits the university medical school which it can accomplish by adapting to this purpose the university extension methods, which have been so successful in other branches of learning. Especially available for this service as lecturers and writers will be those members of the medical faculty who are not engaged in active practice, and to whom, therefore, no suspicion of improper motives can attach. The vital and well-established facts in reference to infectious diseases, etc., advice in reference to personal hygiene, clothing, food; the abuse of intoxicants, the need of legislation in reference to sanitary matters and the enormous possibilities of wise enactments—these are but some of the items which may be effectively presented to the public by means of the university extension and correspondence courses, articles in the newspapers and popular magazines, and through other avenues of instruction. Existing organizations like the social clubs for either sex, university extension centers, churches, and the like, may be readily utilized in this work.

THE METHODS OF THE UNIVERSITY MEDICAL SCHOOL.

The methods of the university medical school will differ in some respects radically from those which have heretofore obtained. While didactic and so-called clinical instruction to classes of 200 or 300 students may continue to have place, that place will be a very limited one. Students must be taught singly or in small groups in the laboratory, at the bedside, and in the dispensary, where they may train their faculties and acquire knowledge at first hand by seeing, hearing and handling things, instead of at second-hand by merely reading or

hearing what some one else has had to say about them. Then, too, education and not the imparting of information will be the prime subject of instruction. In the ten months formerly available there seemed so much knowledge to impart that there appeared to be time for little else, but with the thirty to thirty-six months now occupied by the medical course, and with the obvious impossibility of imparting any considerable fraction of our medical store in thrice that time, it has come to be realized that the actual facts selected for the student's acquisition are of minor importance, but that it is a vital matter that he acquire the ability to observe accurately, record clearly and concisely and to think logically along medical lines. This means that the scheduled work of the curriculum must consume fewer hours of the day—never to exceed six—that the remainder of his working day may be spent in the library, or in his room learning to use medical literature properly, to write clearly and to think! to think! to think! It is surprising how absurdly overcrowded, and how utterly unbalanced the curricula of most of our medical schools have grown. In not a few of them, eight and even nine hours of scheduled work being daily demanded.

THE ELECTIVE SYSTEM.

Nothing offers a more ready and satisfactory solution of this difficulty than the elective system—so long and successfully in vogue in some institutions of general learning and recently adopted, in whole or in part, by some medical schools. It may be defined as that plan by which a student, pursuing a course for a degree, is allowed some choice in the studies he shall pursue, in his methods of study and of the teachers who shall instruct him; to adapt, in a word, his course of study to his tastes, his ability and his needs. It finds its *raison d'être* in two fundamental and obvious facts: the vastness of knowledge and the variability of individuals. If it were possible to encompass all medical knowledge within the limits of a four years' course of study, or if it were possible to select for all students alike those facts which are most essential for every one of them to know, then the question of curriculum would present little difficulty. Neither of these things is possible and therefore the items of information which are acquired

by each student, exclusive of a few of the fundamental and important truths in each branch, are not of necessity nor with advantage, the same for each student. On the other hand, students differ very widely in mental make-up, and no plan of education can be successful in developing the best there is in each man which fails to take cognizance of this fact and adapt its course of preparation to each individual, or, rather, to permit the student to so adapt it by the election of his work with the advice and approval of his instructors.

It will be no purpose of the elective system to make specialists of the undergraduate student, and any tendency in this direction may be readily avoided. It is unfortunate that the term "elective" should have been used in such a restricted sense by some writers as applying only to a system where the student is allowed absolute freedom of choice as between major branches. All of the advantages of election may be secured in full measure by requiring a specified minimum of work in each branch, as in anatomy, physiology, medicine, surgery, obstetrics, and the like, but permitting choice as to topics, methods of study and of teachers. Such a demand together with the requirement of the approval of a dean or other officer of the registration card, and the subjection of the student to a thorough practical examination in each of the major subjects, previous to graduation, affords a perfect safeguard against this abuse. Moreover, the good sense and judgment of the student himself, which teachers are prone to underestimate, are, in themselves, a sufficient safeguard.

I have elsewhere discussed the merits of the elective system as applied to medicine,¹ and the limits of this address preclude a fuller presentation of this important topic at this time. It will suffice to say that in the medical schools where it has been adopted on the most liberal lines, it has proven eminently satisfactory and has been demonstrated to be quite as decided an advance in the medical as in other departments of education.

THE CONTINUOUS SESSION.

The continuous session, in one form or another, will be a conspicuous feature of the university medical school; that is to say, the school will be in session, with

1. Bulletin of the Am. Acad. of Med., July, 1900.

perhaps slight intermission throughout the year in northern climates where work in the summer months is feasible. A board of trustees composed of business men will be little likely to allow an expensive plant to lie idle three or four months of the year, any more than they would close a manufacturing plant, representing an investment of several millions of dollars, for a like period. And this does not mean that only special or supplemental courses for teachers, physicians or students will be offered during vacation period, but that full work will be done throughout the year, exactly the same during the summer months as at other periods. Such a plan is scarcely feasible except under the elective system, for reasons sufficiently obvious. The continuous session is especially advantageous to the self-supporting student, who may often find it more convenient to devote the winter months to some bread-winning occupation. It is, moreover, of assistance in subdividing the classes, especially for clinical work, which can only be done satisfactorily in small groups. Many diseases, too, are to be seen and studied in the summer which are peculiar to that season. The continuous session will enable the ambitious, progressive student to shorten the period between his matriculation and graduation, and this ought to be made possible. It is true that this is in contravention of the present medical practice acts and of the rulings of the several state boards of medical examiners—rulings which seemed necessary to correct a serious evil at the time they were passed, but there is no logical defense for the present chain and halter method of hitching students together and compelling all to go at an unvarying pace. A certain minimum amount of accomplishment should be demanded, but while one student might require five full years to complete such a course, another may do it equally well in three, and he should be permitted to do so. Alexander Hamilton completed a law course, ordinarily requiring three years, in four months—an extreme exception, to be sure, but illustrative of the great difference in power of accomplishment between individuals.

The same laboratory methods which have been so successfully applied to the fundamental branches must be utilized in the teaching of the clinical branches, and this means that the medical school must have hospitals

—not necessarily large—under its absolute control and available for research work in the clinical branches by all modern methods. It means, too, that some of the clinical teachers will be wholly engaged in teaching and research work to the exclusion of practice, and an adequate corps of trained assistants, both in laboratory and clinical lines. The clinical faculty will, therefore, comprise two classes—those who are exclusively devoted to teaching, research work and hospital practice, and who are adequately compensated therefor, and those who are in active practice—both hospital and private, but who devote a portion of their time to teaching and investigation.

THE EXTRAMURAL CLINIC.

While the university must have research hospitals under its own control, the amount of clinical material which is required for the large number of students is so enormous, and the expense of maintaining large hospitals so stupendous, that it seems unlikely that the millions of money which such a plant would require will be within the control of the university in the near future. But even with unlimited means, it would be poor business policy to neglect the large amount of clinical material already available in existing hospitals, but unutilized for teaching purposes, and especially would this be unwise in view of the fact that the use of these patients for teaching purposes is certain to be of great advantage to the patients themselves. No patients are so exhaustively examined, so carefully studied and so well treated as those who are the subjects of clinical teaching.

In almost every large city are hospitals in which the members of the attending staff are anxious to teach; and students are sorely in need of clinical material. All of this difficulty may be adjusted by a system of extramural clinics. Needless to say that the members of the several staffs who are appointed to extramural positions should be selected with due reference to their capacity as teachers and investigators, and never should one be given such an appointment merely because he can command a large amount of clinical material. By judicious effort in many cases the appointment of competent men can be secured to hospital staffs to the betterment of the

clinic and the advantage of the patients, as well as for the extension of the extramural work. The removal of these hospitals by some distance from the college is not an insurmountable objection, for students will cheerfully go a considerable distance to receive such opportunities if the courses are only so arranged that the time spent in going and coming be not too great in proportion to the hours occupied by the course. It is usually best to arrange these courses so they will occupy a half-day. In the very large cities the establishment of two or three clinical centers, where students may remain in residence for the whole or part of the year, will enable all of the hospitals to be easily reached. Extramural teaching is only possible under the elective system, where credit is given for the work on the course for the degree, for the student's time is too fully occupied to permit of his giving much time to work which carries no credit. The control of very large charity hospitals by political appointment should be no discouragement, for by the combined and persistent efforts of the faculty, aided by the influential men of the board of trustees, even these obtuse politicians can sooner or later be convinced of the enormous advantage to the institution and its inmates of this kind of service.

The necessity for great care in the courteous and careful handling of patients needs to be strongly emphasized, for nothing will be more certain to prejudice the public against clinical work of this kind than a harsh, discourteous manner on the part of the clinician, the undue and unnecessary exposure of the body sometimes resorted to, or the granting of too great liberty to the thoughtless student. An undergraduate should rarely be allowed to examine a patient except in the presence of an instructor. Properly conducted, extramural clinical teaching is of advantage to the patient, the student, the attending physician, the hospital; indeed, to all concerned, and it offers a ready and practical solution of a serious difficulty which just now presents itself to the medical school.

THE MIGRATION OF STUDENTS.

The migration of students from one school to another, such as is common in the German universities, is a plan which ought to be encouraged. Such a custom

enlarges the student's latitude of election, broadens his mental outlook, and the constant interchange of students strengthens and stimulates the several colleges and the individual teachers.

PRACTICAL EXAMINATIONS.

The question of thorough, practical examinations as the final test of the student's ability to enter safely on the practice of his profession, has been much neglected in America. It is a matter of great importance and must be satisfactorily solved by the university medical school, but time does not permit a fuller discussion of the matter in this address.

THE NEED OF ENDOWMENT.

The expense of carrying out the scheme which I have briefly outlined for a modern medical school is enormous. With the largest classes, and even prohibitory fees, the income from tuition must fall far, far short of meeting that cost. In a word, the cost of a modern medical education has grown to be greatly in excess of the student's ability to pay for it. State aid or private endowment must be had if these plans are to be realized. With our present outlook private beneficence holds out much the larger promise, and in the hope of such assistance there is every reason to feel the greatest encouragement. The recent gifts to medical institutions and for the promotion of medical research on a princely scale, furnish conclusive evidence of the fact that men of affairs and of large capital, whose chief desire is to find a use for their means which shall be of the largest service to the world, have come to realize that, in these medical channels, large gifts are more likely to yield a certain, speedy and bountiful return in good to the world than in almost any other. And so, in conclusion, let me assure you that the outlook is most hopeful. The modern university school is already in existence in three or four cities, and while it has not yet come to its full glory and usefulness, we may rest assured that the signs are most encouraging, and that in the near future we shall have in operation in America medical schools in advance of any which the world has yet seen.

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